

عنوان مقاله:

Corrosion Behavior of a Fe-25at%Sn Supersaturated Solid Solution in H₃PO₄ Solution

محل انتشار:

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خلاصه مقاله:

Corrosion resistance of iron can be drastically improved by addition of passivating alloying elements. A supersaturated solid solution of Fe-25at%Sn was produced by mechanical alloying of commercially pure iron and tin powders for 24 hours using a planetary ball mill. Electrochemical measurements were performed on cold compacted unsintered specimens.. XRD investigation on produced alloy showed the characteristics of a supersaturated solid solution. Corrosion behavior of the solid solution alloy was investigated in 0.1M H₃PO₄ employing potentiodynamic and potentiostatic polarization techniques. The anodic behavior of mechanically alloyed specimens was compared with specimens prepared from individually compacted iron, tin and appropriate admixture of tin/iron powders. Potentiodynamic polarization of supersaturated specimen featured a gradual decrease in anodic current density, indicating a feature of quasi passivation which was attributed to the tin surface enrichment as a result of preferential iron dissolution. Anodic current density from the result of potentiostatic polarization of the prepared alloy also showed a gradual decrease with time following it-0.45 relationships indicating a characterization of passivity. Scanning electron microscopy (SEM) and energy dispersive X-ray spectroscopy (EDX) examination of the specimen surface .after potentiostatic anodic polarization test confirmed the presence of high tin content on the surface

کلمات کلیدی:

Iron passivity, Mechanical alloying, Corrosion, X-ray diffraction

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